



**[4910-13]**

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 25**

**[Docket No. FAA-2012-1216; Special Conditions No. 25-479-SC]**

Special Conditions: Embraer S.A., Model EMB-550 Airplane, Limit Pilot Forces for Sidestick Control

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final special conditions.

**SUMMARY:** These special conditions for the Embraer S.A. Model EMB-550 airplane. This airplane will have a novel or unusual design feature, specifically sidestick controllers designed to be operated with only one hand. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

**EFFECTIVE DATE:** [Insert date 30 days after date of publication in the *Federal Register*].

**FOR FURTHER INFORMATION CONTACT:** Todd Martin, FAA, Airframe and Cabin Safety Branch, ANM-115, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington, 98057-3356; telephone 425-227-1178; facsimile 425-227-1149.

## **SUPPLEMENTARY INFORMATION:**

### **Background**

On May 14, 2009, Embraer S.A. applied for a type certificate for their new Model EMB-550 airplane. The Model EMB-550 airplane is the first of a new family of jet airplanes designed for corporate flight, fractional, charter, and private owner operations. The aircraft has a conventional configuration with low wing and T-tail empennage. The primary structure is metal with composite empennage and control surfaces. The Model EMB-550 airplane is designed for 8 passengers, with a maximum of 12 passengers. It is equipped with two Honeywell HTF7500-E medium bypass ratio turbofan engines mounted on aft fuselage pylons. Each engine produces approximately 6,540 pounds of thrust for normal takeoff. The primary flight controls consist of hydraulically powered fly-by-wire elevators, ailerons, and rudder, controlled by the pilot or copilot sidestick.

Current regulations reference pilot effort loads for the cockpit pitch and roll controls that are based on a two-handed effort. The cockpit roll and pitch controls for the Model EMB-550 airplane are designed for one-handed operation.

### **Type Certification Basis**

Under the provisions of Title 14, Code of Federal Regulations (14 CFR) 21.17, Embraer S.A. must show that the Model EMB-550 airplane meets the applicable provisions of part 25, as amended by Amendments 25-1 through 25-127 thereto.

If the Administrator finds that the applicable airworthiness regulations 14 CFR part 25 do not contain adequate or appropriate safety standards for the Model EMB-550 airplane because of

a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same or similar novel or unusual design feature, the special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the Model EMB-550 airplane must comply with the fuel vent and exhaust emission requirements of 14 CFR part 34 and the noise certification requirements of 14 CFR part 36 and the FAA must issue a finding of regulatory adequacy under section 611 of Public Law 92-574, the “Noise Control Act of 1972.”

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type-certification basis under § 21.17(a)(2).

### **Novel or Unusual Design Features**

The Embraer S.A. Model EMB-550 airplane will incorporate the following novel or unusual design features: The Model EMB-550 airplane is equipped with a sidestick controller instead of a conventional wheel or control stick. This kind of controller is designed to be operated using only one hand. The requirement of 14 CFR 25.397(c), which defines limit pilot forces and torques for conventional wheel or stick controls, is not appropriate for a sidestick controller. Therefore, a special condition is necessary to specify the appropriate loading conditions for this kind of controller.

## **Discussion**

The Embraer S.A. Model EMB-550 airplane is equipped with a sidestick controller instead of a conventional wheel or control stick. This kind of controller is designed to be operated using only one hand. The requirement of 14 CFR 25.397(c), which defines limit pilot forces and torques for conventional wheel or stick controls, is not appropriate for a sidestick controller, because pilot forces are applied to sidestick controllers with only the wrist, not arms. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

## **Discussion of Comments**

Notice of proposed special conditions No. 25-12-13-SC for the Embraer S.A. Model EMB-550 airplanes was published in the *Federal Register* on November 20, 2012, (77 FR 69571). No comments were received, and the special conditions are adopted as proposed.

## **Applicability**

As discussed above, these special conditions are applicable to the Model EMB-550 airplane. Should Embraer S.A. apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design feature, the special conditions would apply to that model as well.

## **Conclusion**

This action affects only certain novel or unusual design features on one model of airplanes. It is not a rule of general applicability.

## List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

### The Special Conditions

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type certification basis for Embraer S.A. Model EMB-550 airplanes.

#### 1. Limit Pilot Forces for Sidestick Control.

In lieu of the pilot forces specified in § 25.397(c):

a) The limit pilot forces are:

<b>Pitch</b>	<b>Roll</b>
Nose up 200 pounds force (lbf)	Nose left 100 lbf
Nose down 200 lbf	Nose right 100 lbf

b) For all other components of the sidestick control assembly, excluding the internal components of the electrical sensor assemblies, to avoid damage as a result of an in-flight jam.

<b>Pitch</b>	<b>Roll</b>
Nose up 125 lbf	Nose left 50 lbf
Nose down 125 lbf	Nose right 50 lbf

Issued in Renton, Washington, on February 12, 2013.

Ali Bahrami  
Manager, Transport Airplane Directorate  
Aircraft Certification Service

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